SOCIETIES AND ACADEMIES.

LONDON.

Chemical Society, November 3.—Prof. W. A. Tilden, F.R.S., in the chair.—The following papers were read:—Studies on the dynamic isomerism of α- and β-crotonic acids, part i.: R. S. **Morrell** and E. K. **Hanson.** Preliminary experiments on the freezing points of mixtures of the two acids furnish no evidence as to the existence of a compound of α- and β-crotonic acids between 100° and 168°, and between 15° and 71°·9.—The constitution of nitrogen iodide: O. **Silberrad.** In the interaction of zinc ethyl with nitrogen iodide it was found that trimethylamine was produced. This confirms Chattaway's view that the iodide has the constitution $NH_3:NI_3$.—The available plant food in soils: H. **Ingle.** Extraction with a 1 per cent. solution of citric acid for seven days renders a soil much less fertile, especially at first, but chemical changes in such soil, during the growth of the plants, gradually render it again capable of supplying plant food.—The basic properties of oxygen: compounds of the ethers with nitric acid: J. B. **Cohen** and J. **Gatecliff.** It is shown that with aliphatic ethers unstable compounds of the type X_2O,HNO_3 are formed.—Note on the influence of potassium persulphate on the estimation of hydrogen peroxide: J. A. N. **Friend.** It is shown that a secondary reaction, represented by the following equation,

$$H_2O_2+K_2S_2O_8=K_2SO_4+H_2SO_4+O_2,$$

probably takes place in addition to the main reaction.—The influence of sunlight on the dissolution of gold in aqueous potassium cyanide: W. A. **Caldecott.**—The fractional hydrolysis of amygdalinic acid, *iso*-amygdalin: H. D. **Dakin.**—The effect of anhydrides on organo-magnesium bromides, part i., the action of phthalic anhydride on magnesium α-naphthyl bromide: S. S. **Pickles** and C. **Weizmann.**—The combustion of ethylene: W. A. **Bone** and R. V. **Wheeler.** The principal results of these experiments are as follows:—(1) there is no preferential combustion of either carbon or hydrogen; (2) formaldehyde is the most prominent intermediate oxidation product; (3) there is no separation of carbon or liberation of acetylene.—The decomposition of methylcarbamide: C. E. **Fawsitt.** The decomposition of methylcarbamide by acids is due to a transformation of the methylcarbamide into methylamine cyanate, which is subsequently decomposed by the acid.—Position isomerism and optical activity; the methyl and ethyl esters of di-*o*-, -*m*-, and -*p*-nitrobenzoyltartaric acids: P. F. **Frankland** and J. **Harger.** The authors describe the preparation and properties of the six esters in question.—The action of nitrogen sulphide on organic substances, part ii.: F. E. **Francis** and O. C. M. **Davis.**—Reduction products of αβ-dimethylanhydracetonebenzil, and condensation products of benzaldehydes with ketones: F. R. **Japp** and W. **Maitland.**—Interaction of sodium phenylglycidate with phenylhydrazine: F. R. **Japp** and W. **Maitland.**—α-Benzoyl-β-trimethacetylstyrene: F. R. **Japp** and W. **Maitland.**—Olefinic ketonic compounds: S. **Ruhemann.**—Δ^{α}-Oleic acid: H. R. **Le Sueur.**—Action of magnesium alkyl halides on derivatives of camphor: M. O. **Forster.**—Sulphonchloroalkylamides: F. D. **Chattaway.**

Linnean Society, November 3.—Prof. W. A. Herdman, F.R.S., president, in the chair.—Mr. G. Claridge **Druce** showed specimens of a new British grass, *Koeleria valesiaca,* Gaud., which he had found in the herbarium of Dillenius at Oxford, and recently re-found in the original locality at Brent Down, Somersetshire.—The Rev. John **Gerard,** S.J., brought specimens of a proliferous plantain (*Plantago major*) from the neighbourhood of Clitheroe, Lancashire.—Mr. Frank **Crisp** brought for exhibition a flower of *Schubertia graveolens,* Lindl., an asclepiad, which, deprived of its corolla and with a portion of its calyx cut away, viewed from the side, presented the genitalia in the shape of a skull.—A note on some points in the structure of the gill of the Ceylon pearl-oyster: the **President.**—Notes on the "sudd" formation of the Upper Nile: A. F. **Broun.** The author gives a list of the plants forming the mass of vegetation, which, favoured by the silt brought down by the White Nile, helps to block the shallow channels.—Bryozoa from near Cape Horn: A. W. **Waters.** The paper deals with specimens which were collected by the French "Mission scientifique du Cap Horn," but were not mentioned by Jullien in his report on the "Bryozoaires" of that expedition, published in 1888. From this material, which Jullien had presumably not handled, Mr. Waters adds twenty-eight species to the original list of fifty-six. He gives further particulars in regard to some of those named by his predecessor, and points out that eight species established by Jullien had been already described under other names. He rectifies two erroneous identifications, enlarges the range of distribution for several species, and for six of them calls to mind that they were first discovered by the *Challenger.*

Mathematical Society, November 10.—Prof. H. Lamb, president, in the chair.—The council and officers for the ensuing session were elected. They are as follows:—president, Prof. Forsyth; vice-presidents, Prof. Burnside, Prof. Elliott, Prof. Lamb; treasurer, Prof. Larmor; secretaries, Prof. Love and Mr. Grace; other members of council, Mr. Berry, Mr. Campbell, Dr. Glaisher, Dr. Hobson, Major MacMahon, Mr. Mathews, Mr. Western, Mr. Whittaker, Mr. A. Young.—Prof. Forsyth having taken the chair, Prof. **Lamb** delivered an address on deep-water waves. He reviewed the theory of the waves produced on deep water by a local disturbance of the surface. The theory developed independently by Poisson and Cauchy had often been regarded as obscure, and it had never been interpreted completely. The problem has a deeper significance in that it offers perhaps the simplest example of the propagation of waves in a dispersive medium, and was the origin of the theory of group velocity, which has so many applications in various branches of physics. After tracing the history of the problem, the author proceeded to disengage the essential results of the theory from the clouds of analysis in which they had been involved; he pointed out the connection of the analytical results with the analysis which was used at a later date for the investigation of the phenomena of diffraction; he traced the forms of the waves due to a local initial elevation both at considerable and at small distances from the source of disturbance; and he pointed out the significance of the results when interpreted by means of modern notions concerning waves of approximately simple harmonic type and the propagation of groups of such waves. Finally, he discussed the solution of the problem of waves generated by a local and periodic variation of pressure.—The following papers were communicated:—Note on the application of the method of images to problems of vibrations: Prof. **Volterra.** It is shown how to obtain by means of the method of images a complete solution of the problem of vibrations of a membrane, and it is pointed out that although the train of images may be infinite, yet the number of terms in the solution is finite.—The zeros of certain classes of integral Taylor's series, two papers: G. H. **Hardy.** The nature of the zeros of some particular classes of functions, allied to the exponential function, is determined with much greater precision than can be attained by any of the known general theorems. If $\phi(n)$ is an integer when n is an integer, and the increase of $\phi(n)$ is regular and sufficiently rapid, there are exactly $\phi(n)$ zeros of $\Sigma\frac{x^{\phi(n)}}{\phi(n)!}$ within the circle $|x|=\phi(n)$, and their positions can be determined very precisely. In the second paper similar investigations are given for other functions of which $\Sigma\frac{x^n}{(np+1)^n n!}$ is an example.—On the reducibility of covariants of binary quantics of infinite order: P. W. **Wood.** The paper contains the conditions that any covariant linear in the coefficients of each of δ binary quantics of infinite order should be expressible in terms of products of covariants of lower total degrees. The reducibility of covariants of degree 4 is determined completely, and certain classes of reducible covariants of degree δ and weight $\geqslant(2^{\delta-1}-1)$ are discussed.—The linear difference equation of the first order: Rev. E. W. **Barnes.** The questions to be considered relate to the existence of solutions, their analytical expression, and their place among transcendental functions. These questions are discussed from the point of view of the theory of functions of complex variables, the arguments of the functions which occur in the difference equations being assumed to be complex.—Curves on a conicoid: H. **Hilton.**—Remarks on alternants and continuous groups: Dr. H. F. **Baker.**—Expansions of the

elliptic and Zeta functions of $\frac{2}{3}K$ in powers of q: Dr. J. W. L. **Glaisher.**—Examples of perpetuants: J. E. **Wright.**—Two simple results in the attraction of uniform wires obtained by quaternions: Prof. **Genese.**—A theorem relating to quotient groups: Prof. **Miller.**—On certain classes of syzygies: A. **Young.**

CAMBRIDGE.

Philosophical Society, October 31.—Annual general meeting, Dr. Baker, president, in the chair.—Prof. Marshall Ward, F.R.S., was elected president for the session 1904–5.—On the dimorphism of the English species of Nummulites: J. J. **Lister,** F.R.S. The author gave an account of his examination of the characters of three English species of Nummulites, *N. laevigata* (Brug.), *N. variolaria* (Lam.), and *N. elegans* (Sow.), with respect to dimorphism. It appears that these species, far from invalidating the conclusion that the species of Nummulites are dimorphic, are in complete accord with it.—A problem concerning wood and lignified cell-walls: Prof. Marshall **Ward,** F.R.S. Dr. W. J. Russell some time ago showed that if a block of wood is laid on a photographic plate, and kept in the dark for some time, a photographic image will be found on the plate after ordinary development, although no light has had access; and he has summarised his numerous and important observations in a recent paper in the *Philosophical Transactions*. Since resinous woods were found especially active, Russell suggested that some active body of resin-like nature was the agent concerned, and that hydrogen peroxide was developed. Prof. Marshall Ward's paper describes experiments which were directed to the questions, (1) can this photographic contact-method be utilised to obtain images of thin and microscopic sections of wood? and (2) what other substances, *e.g.* in woods devoid of resin, are active? The author showed photographs, obtained without light, of thin sections of many different kinds of wood, and demonstrated that in most cases resin and allied bodies cannot be the active agents. He also showed that a thin section which gives a very faint image, or even no recognisable image at all, if used dry and untouched, may give a very deep one if soaked in a weak solution of tannin, gallic acid, pyrogallol, &c., and then dried before being placed on the plate. A striking result is obtained if such solution is streaked across the section; the treated streak or figure comes out deep black on a pale ground-work of the part untreated. Xylol, clove oil, tannic acid, and some other bodies are also active. The author thinks that a careful comparative investigation of all kinds of woods might lead to important results regarding that very difficult question, the constitution of lignified cell-walls.—The pine-apple gall of the spruce: note on the early stages of its development: E. R. **Burdon.** The galls are caused by certain Aphidæ belonging to the genus Chermes. The insect drives its proboscis into the bud, and sets up an irritation which results in the young shoot becoming modified into a gall. The early stages of the gall take place whilst the shoot is still enclosed in the winter bud scales. The cells are forced into precocious growth, and a parenchymatous tissue, consisting of swollen cells with vacuolated protoplasm and enlarged nuclei, is formed. The chlorophyll, tannin, resin, resin canals, and secretory cells all disappear, but an abundant supply of starch is laid down which may possibly arise as the ultimate product of the disintegration of the tannin. The chromatin network of the nuclei becomes aggregated into wart-like nucleoli. The mitotic figures appear to be of the usual somatic type, and no indication of heterotypical mitoses has yet been found. There is reason for believing that the ultimate cause is an injection by the insect, and that this injection will cause a gall growth only when it acts on embryonic tissues which are not confined by other lignified or cuticularised tissues.—On certain quintic surfaces which admit of integrals of the first kind of total differentials: A. **Berry.**

MANCHESTER.

Literary and Philosophical Society, November 1.—Prof. W. Boyd Dawkins, F.R.S., president, in the chair.—On alkaline borates: C. H. **Burgess** and A. **Holt,** jun. The authors found that nearly all the glasses obtained by fusing boric anhydride with varying quantities of sodium carbonate could be transformed, wholly or in part, into stable, crystalline forms, which invariably melt at a higher temperature than the glasses from which they were derived. The study of the melting points of these mixtures, and the analyses of the crystals and glasses, point to the probable existence of both sodium metaborate and a further compound containing only a quarter equivalent of sodium. Anhydrous borax itself does not appear to be a definite compound; it is almost a eutectic mixture of the solid solution of the two above mentioned compounds. The glasses appear to be a superfused state of the crystals. The familiar colours of borax beads seem to be due to the formation of a complex sodium ion, and can be changed in tint by increasing or decreasing the amount of alkali present.—Note on the electrolytic preparation of titanous sulphate: W. H. **Evans.** The results show that a low current density, high concentration, and a temperature of about 70° C. are the most favourable for obtaining an efficient yield in this reduction process. Moreover, the author has found that the preparation can be carried out without the use of any diaphragm to separate the anode from kathode chambers of the cell.

DUBLIN.

Royal Irish Academy, November 14.—Prof. R. Atkinson, president, in the chair.—On the discovery of hyæna, mammoth, and other extinct Mammalia in a Carboniferous cavern in the county of Cork: R. J. **Ussher.** After recapitulating the work that has been done in Irish caves, Mr. Ussher described an extensive cavern in county Cork, near Doneraile, in every portion of which that he has examined remains of extinct Mammalia have been found. Mammoths, old and young, have been met with in several places; bears and reindeer were abundant; Irish elk, wolf, and hyæna were also found; the last, identified by Dr. Scharff from a portion of a skull with teeth, is an addition to the Irish fauna. These remains were in red sand beneath a floor of crystalline stalagmite, which was present in the various chambers and galleries.

PARIS.

Academy of Sciences, November 7.—M. Mascart in the chair.—Researches on the desiccation of plants and vegetable tissues: final equilibrium, under average atmospheric conditions: M. **Berthelot.** The rate of loss of moisture is proportional at any instant to the quantity of water remaining in the plant. A further amount of moisture is driven off at 110° C.—On the absolute desiccation of plants and vegetable materials: period of artificial desiccation. Reversibility by atmospheric moisture: M. **Berthelot.**—On the preparation in a state of purity of boron trifluoride and silicon tetrafluoride, and on some physical constants of these compounds: Henri **Moissan.** The boron fluoride was prepared in two ways, by heating a mixture of boric anhydride and calcium fluoride with sulphuric acid, and by direct synthesis from boron and fluorine. After purification, the gas was frozen by liquid air, foreign gases pumped off, and the solid allowed to volatilise. The boron fluoride melted at −127° C. and boiled at −101°. Silicon fluoride, purified in a similar manner, melts at −97°, and passes into the gaseous state without melting. The experiments establish the physical identity of BF_3 and SiF_4 prepared synthetically with the compounds prepared by the ordinary chemical methods.—On the nature of *charriage*: Ed. **Suess.**—Remarks by Michel **Lévy** on the preceding paper.—On a hyperelliptic surface: M. **Traynard.**—On the complementary geodesic triangulations in the higher parts of the French Alps: P. **Helbronner.**—On a new mode of constructing aerial helices: Ch. **Renard.** The helices described are 2·5 m. in diameter, and are perfectly rigid when rotated by power, although their weight is only 3 kilograms.—On explosions in boilers: L. **Lecornu.**—Retrograde diffusion in electrolytes: E. **Bose.** The author points out that the results obtained experimentally by Thovert were predicted by Abegg and Rose on Nernst's theory.—On the estimation of temporary radio-activity for its therapeutic utilisation: Th. **Tommasina.**—The proof of a radio-activity peculiar to living beings, vegetable and animal: Th. **Tommasina.**—The action of low temperatures on colouring matters: Jules **Schmidlin.** An alcoholic solution of rosaniline chlorohydrate shows a clear diminution in the intensity of the red colour, and at the same time developes a fine greenish-yellow fluorescence.—Heats of combustion of

triphenylmethyl and some derivatives of triphenylmethane: Jules **Schmidlin.**—The preparation of iodide of gold by the action of iodine on gold: Fernand **Meyer.** The iodide AuI can be obtained by the direct action of iodine upon gold at temperatures between 50° and 100°. Below 50°, or above 200°, there is no action. In the presence of water in a closed vessel iodine gives with gold the same aurous iodide.—On a yttrium earth near to gadolinium: G. **Urbain.** An attempt to isolate an element characterised by the band $\lambda = 488$.—On β-bromobutyric acid: M. **Lespieau.** The amide of this acid is obtained by saturating allyl cyanide with hydrobromic acid in the cold. A crystalline mass separates, which, when dissolved in concentrated hydrobromic acid solution, deposits white crystals of the amide.—The oxidation of acetol: André **Kling.**—On the formation of formaldehyde during the combustion of tobacco: A. **Trillat.** The experimental results show that aldehydes are formed during the combustion of tobacco, notably formaldehydes. The toxic effects, however, are modified by the fact that these aldehydes immediately combine with the nitrogenous bases given off at the same time.—On the germination of the spores of *Atrichum undulatum* and *Hypnum velutinum*, and on their nutrition in sterilised liquid media: Paul **Becquerel.**—On the development of the kidney and Leydig's gland in the Elasmobranchs: I. **Borcea.** The kidney of the Elasmobranchs has the same value as that of the higher vertebrates.—The influence of the feeding on the length of the intestine of the larvæ of *Rana esculenta*: Émile **Yung.**—On an infectious disease of horses, with alterations in the bones, observed at Madagascar: MM. **Charon** and **Thiroux.**—On the general structure of the Tyrolese Alps west of the Brenner Railway: Pierre **Termier.**—Modifications undergone by the nutritive exchanges in skin disease: A. **Desgrez** and J. **Ayrignac.**

NEW SOUTH WALES.

Royal Society, September 7.—Mr. C. O. Burge, president, in the chair.—Notes on the theory and practice of concrete-iron constructions: F. M. **Gummow.** The author outlined the theory from the present standpoint of scientific research, and after reviewing the principal applications, concluded his paper by giving particulars of a test of concrete-iron plate beams, carried out on a large scale.—Further experiments on the strength and elasticity of reinforced concrete: Prof. W. H. **Warren.** The author stated that the paper consisted of an experimental investigation of the physical properties of Portland cement mortars and concrete when reinforced with steel.

Linnean Society, September 28.—Dr. T. Storie Dixson, president, in the chair.—Monograph of the Australian Cicadidæ: Dr. F. W. **Goding** and W. W. **Froggatt.** Descriptions of all the Cicadidæ attributed to Australia, amounting to 115 species, comprised in 21 genera, are given. In connection with the geographical distribution of the species it may be mentioned that though many are strictly confined to the coastal forests of eastern Australia, others are found sporadically over a very large area, reappearing in widely separated districts if the suitable class of country presents itself. For example, *Tibicen willsi*, Dist., described from Rockhampton, ranges up the Queensland coast to Townsville, occurs also at Bourke, N.S.W., and reappears at King's Sound, N.W.A. Indo-Malayan affinity is indicated by the occurrence of the genera Gæana and Huechys.—Notes on Neuroptera, with descriptions of new species: W. W. **Froggatt.**—Ngarrabul and other aboriginal tribes, part ii., distribution of the tribes: J. **MacPherson.** The distribution of twenty-four tribes in north-east New South Wales and South Queensland, in accordance with the languages spoken and as gleaned from Ngarrabul sources of information, is discussed and mapped.—Notes on the native flora of New South Wales, part i., the Tumbarumba and Tumut districts: R. H. **Cambage.** These notes comprise observations on the conspicuous vegetation of the country between Wagga, Tumbarumba, Tumut, and Gundagai during the drought of 1903, and serve to show the striking differences between the flora of the low country round Wagga (600 feet above sea-level) and that of Laurel Hill or Bago, near Tumbarumba (about 3300 feet), where the vegetation presents a recognisable Tasmanian facies.

DIARY OF SOCIETIES.

THURSDAY, NOVEMBER 17.

ROYAL SOCIETY, at 4.30.—Air Resistance Encountered by Projectiles at Velocities up to 4500 Feet per Second: A. Mallock, F.R.S.—Theory of Amphoteric Electrolytes. Part II.: Prof. J. Walker, F.R.S.—Enhanced Lines of Titanium, Iron, and Chromium in the Fraunhoferic Spectrum: Sir Norman Lockyer, K.C.B., F.R.S., and F. E. Baxandall.—On the Group IV. Lines of Silicium: Sir Norman Lockyer, K.C.B., F.R.S., and F. E. Baxandall.—The Electrical Conductivity and other Properties of Sodium Hydroxide in Aqueous Solution, as Elucidating the Mechanism of Conduction: W. R. Bousfield, K.C., M.P., and Dr. T. Martin Lowry.—On the Wetting of Cotton by Water and by Water Vapour: Prof. D. Orme Masson, F.R.S.

LINNEAN SOCIETY, at 8.—On the Structure of the Stems of Plants: Lord Avebury, F.R.S.—Observations on Undescribed or Little Known Species of Membracidæ: G. B. Buckton, F.R.S.

FRIDAY, NOVEMBER 18.

INSTITUTION OF MECHANICAL ENGINEERS, at 8.—Impact Tests on the Wrought Steels of Commerce: A. E. Seaton and A. Jude.

EPIDEMIOLOGICAL SOCIETY, at 8.30.—The Inauguratory Address on the Epidemiological Aspects of Industrial Diseases: the President, Dr. Whitelegge, C.B.

TUESDAY, NOVEMBER 22.

INSTITUTION OF CIVIL ENGINEERS, at 8.—Distribution of Electrical Energy: J. F. C. Snell.

WEDNESDAY, NOVEMBER 23.

GEOLOGICAL SOCIETY, at 8.—On an Ossiferous Cavern of Pleistocene Age at Hoe Grange Quarry, Longcliffe, near Brassington, Derbyshire: H. H. Arnold-Bemrose and E. T. Newton, F.R.S.—The Superficial Deposits and Pre-Glacial Valleys of the Northumberland and Durham Coalfield: D. Woolacott.

FARADAY SOCIETY, at 8.—Recent Investigations Bearing on the Theory of Electrolytic Dissociation: Prof. L. Kahlenberg.—The Potential of the Hydrogen-Oxygen Cell: F. J. Brislee.

SOCIETY OF ARTS, at 8.—The Systematic Promotion of British Trade: Ben. H. Morgan.

THURSDAY, NOVEMBER 24.

ROYAL SOCIETY, at 4.30.

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